Simulation-Based Dynamic Traffic Assignment Education and Deployment

- Status and Future Plans

Yi-Chang Chiu, Ph.D.
University of Arizona
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ARIZONA

Self Introduction

- Ph.D. Transportation Engineering University of Texas at Austin, 2002
- Faculty, Civil Engineering, Univ. of Arizona
- DTA development
  - DYNASMART-P since 1995
  - DynusT since 2002
- DTA education outreach
  - FHWA DTA program since 2005
  - TRB ADB30 Network Modeling Committee
- DTA deployments
  - FHWA DTA program

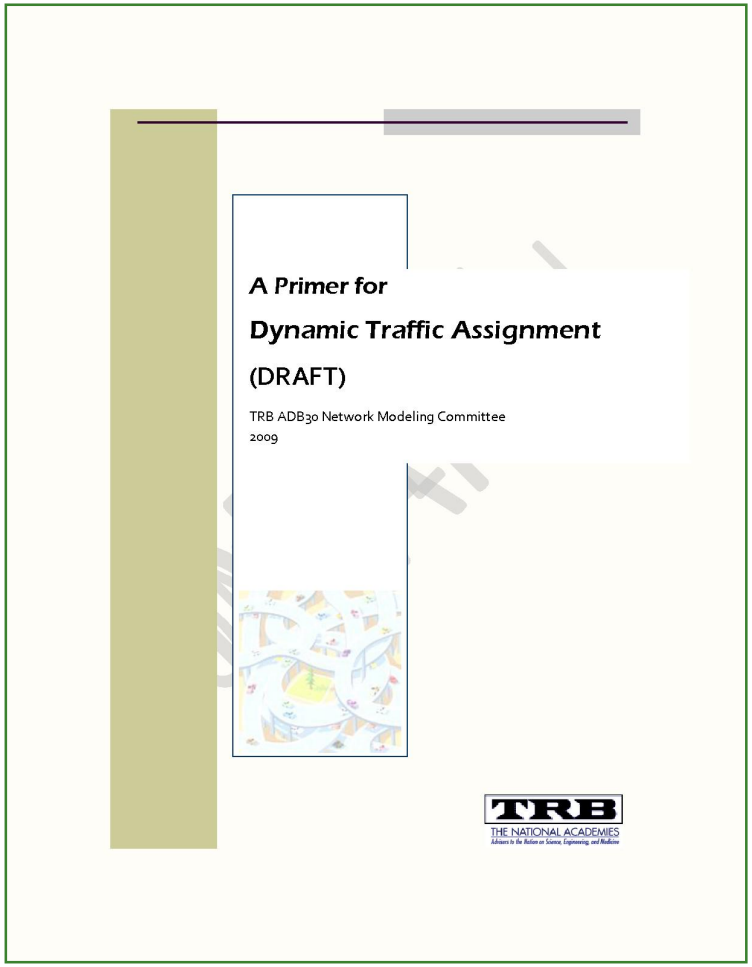
DTA and Planning/Operations Professional Community

- Increased connections between planning and operations
- Need for representing time-sensitive network traffic
  - Represent congestion (spatially and temporally)
  - Capture system response to demand-supply scenarios (capacity improvement, pricing, corridor system operations and planning, etc.)
- Increased awareness (people are talking about DTA!)
- Heightened confusion
  - What is DTA?
  - Do all software packages have similar DTA algorithms?
  - If not, how can one be equipped to know/ask what he/she is getting from different software?

Education and Demonstration are the KEY

- Education activities
  - FHWA DTA program
    - Training workshop opportunities
    - Assistance by FHWA Resource Center (Pihl, Tran, Fok)
  - "DTA Primer" by TRB ADB30 Network Modeling Committee
    - A language neutral, model independent source guide
    - Volunteered effort by credible researchers, developers and practitioners
    - Soliciting external reviewers
    - Scheduled release May 2009
    - DTA roundtable session in TRB planning application conference
    - Four TMIP webinar planned for 2009
- Demonstration activities
  - FHWA DTA program
  - Past and ongoing deployment projects

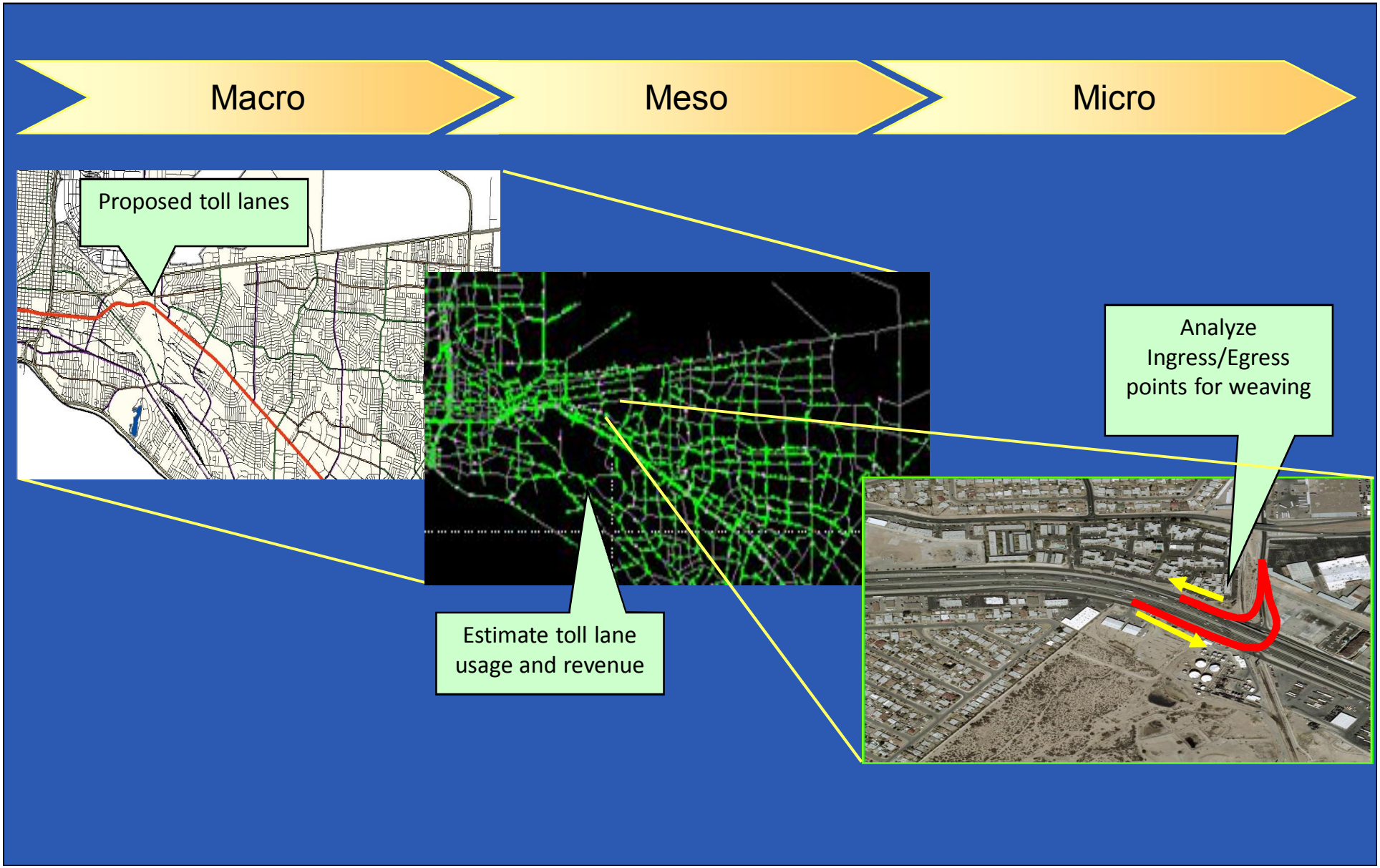
- 1 Why Dynamic Traffic Assignment
  - 1.1 From Transportation Planning Perspectives
  - 1.2 From Traffic Engineering Perspectives
- 2 Dynamic Traffic Assignment in a Nutshell
  - 2.1 Instantaneous and Experienced Travel Times
  - 2.2 Static versus Dynamic Models
  - 2.3 Defining Quality of DTA Model Outputs
  - 2.4 Extended Discussions
    - 2.4.1 One-Shot Simulation with Statically or Dynamically Updated Path Assignment
    - 2.4.2 Disequilibrium versus Non-convergence
  - 2.5 Brief Literature Review
- 3 Decision Making for Applying DTA Tools
  - 3.1 What Applications Find DTA Models Advantageous?
  - 3.2 What to Expect from DTA Models
  - 3.3 Cautions for using DTA Models
  - 3.4 Decision Making for Selecting DTA Models
  - 3.5 Planning for Applying DTA
- 4 General Modeling Process
  - 4.1 Dataset Preparation
  - 4.2 Characterizing the Results of a DTA Run
  - 4.3 Model Validation and Calibration
    - 4.3.1 Qualitative Analysis (Validation/Quality Assurance)
    - 4.3.2 Quantitative Analysis
    - 4.3.3 Calibration Methodology
    - 4.3.4 Measuring Calibration Quality
  - 4.4 Scenario Analysis
  - 4.5 System Monitoring and Re-calibration
- 5 References
- 6 Index



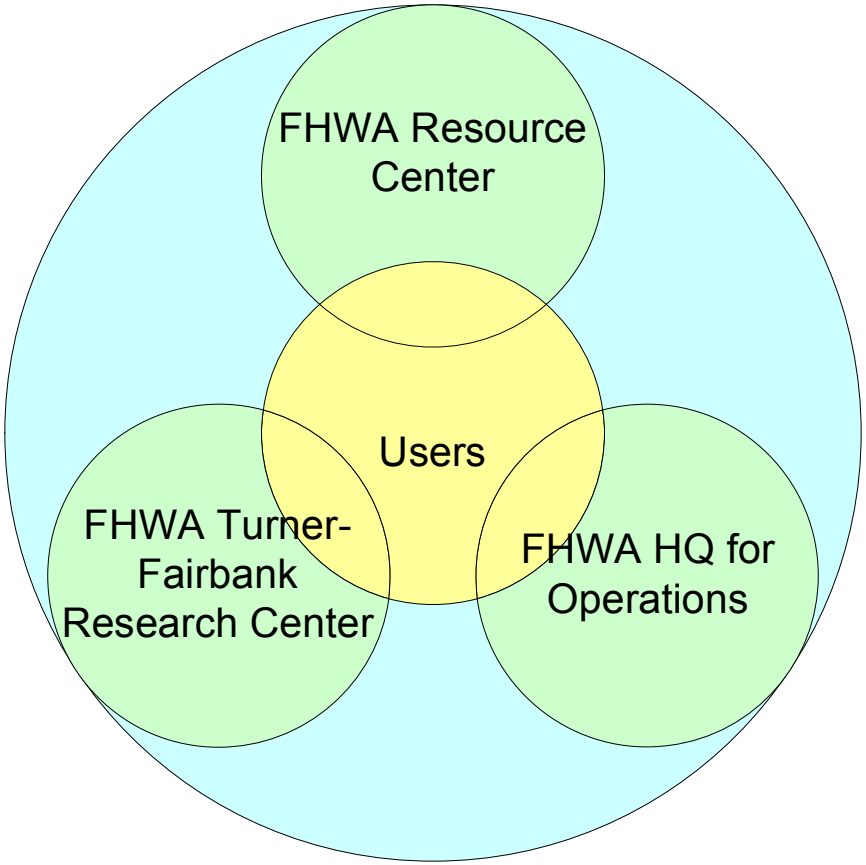
FHWA DTA Program

- Started in 1995
- Two parallel tracks
  - Real-time traffic estimation and prediction for ITS
  - Transportation operational planning
- Linking planning and operations
  - Concept of “Operational Planning”
- Fill-in on the traffic analysis tool gap
  - Macroscopic (static, regional) – mesoscopic (dynamic, regional) – microscopic (dynamic, corridor)
- Integration with TDM and microscopic model
  - Versatile modeling capabilities
  - Leverage existing investment in models

Concept of Multi-Resolution Modeling Appraoch



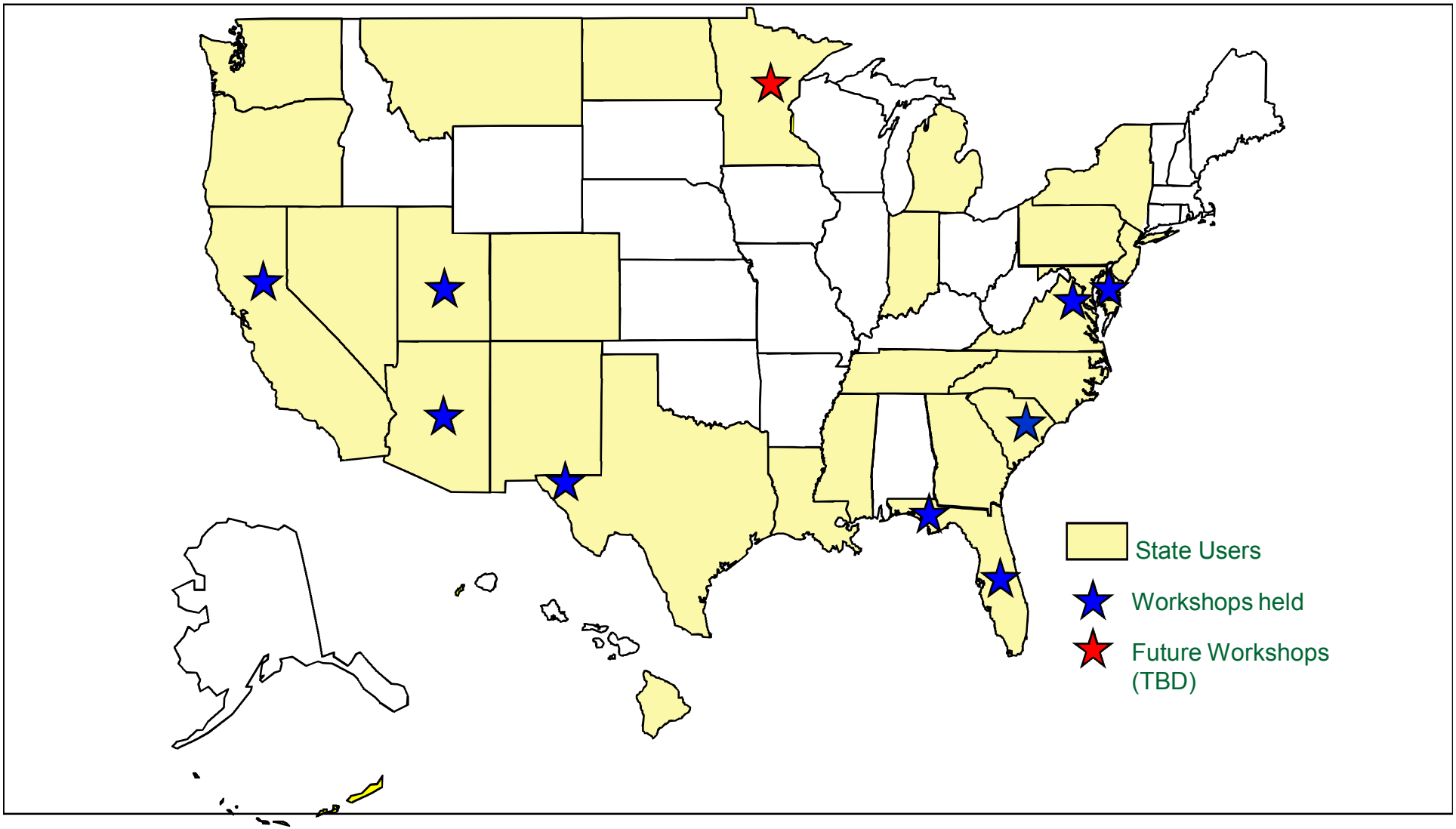
FHWA Support Structure



Program Activities

- DTA concept education and outreach
  - Webinars (online) – several per year
  - Short seminar (0.5-1 day) – on demand
  - Workshops (2.5 day) – 2 to 3 per year
- Technical support to state agencies
  - MPO/DOT > FHWA division > Resource center > FHWA HQ or TFHRC
  - Educational Support
    - Training for DTA concepts
  - Modeling Support
    - Assist in initial modeling and dataset buildup (DYNASMART-P/DynusT)
    - Can be extended to consultants for a federally funded project
    - Matching-fund may be needed if more involvement is requested

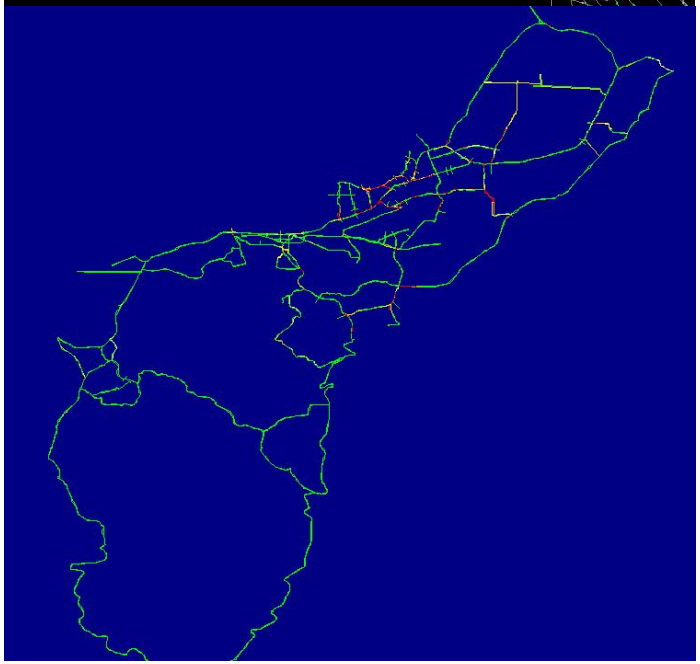
Outreach Status (March 2009)



Existing Users

- 30 states
- 11 nations
  - Canada, Greece, Taiwan, Italy, Trinidad, Netherlands, Israel, Senegal, South Korea, China (Olympics), & Indonesia
- DYNASMART-P – available through McTrans (Univ. of Florida)
- DynusT – free available for DYNASMART-P users (Univ. of Arizona)
- Support for both provided

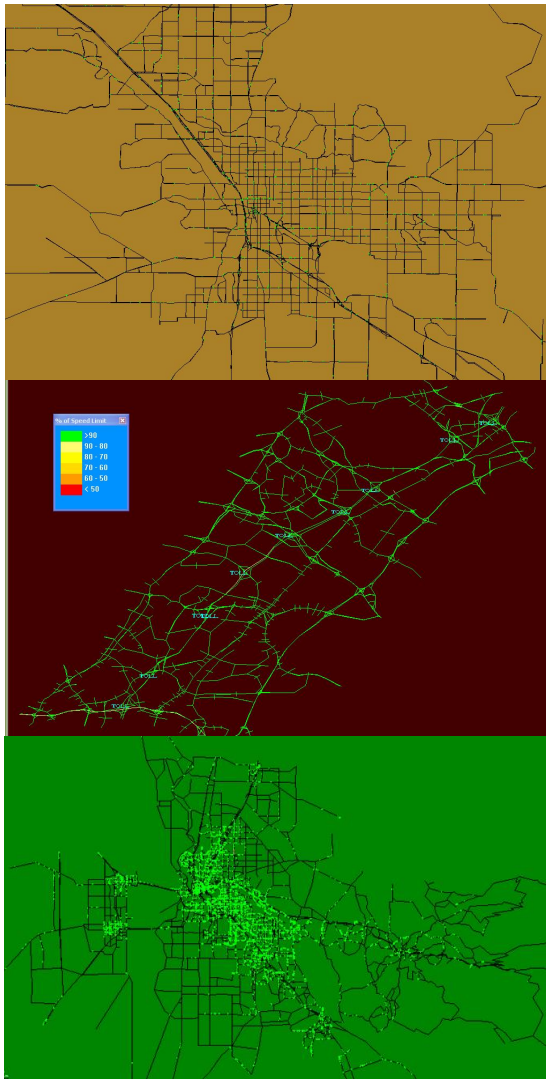
Past/Ongoing Projects



- El Paso, Texas (2003- present)
  - IH-10 Corridor improvement
  - Interchange design alternatives
  - City bypass tolling analysis
  - Bi-national Port-of-Entry modeling
  - Long-range planning

- Guam (2008 – present)
  - Military deployment transportation system impacts
  - Island-wide Haul Road system analysis and design
  - Traffic impact and management strategies

Past/Ongoing Projects



- Tucson (2008-present)
  - Regional Modeling (Z870, N3,5k, L8.7k, 2.9 GB, 12hr for 20 iter, 24hr SA)

PAG Pima Association of Governments

- Baltimore-D.C. Beltway (2008-present)
  - Value pricing

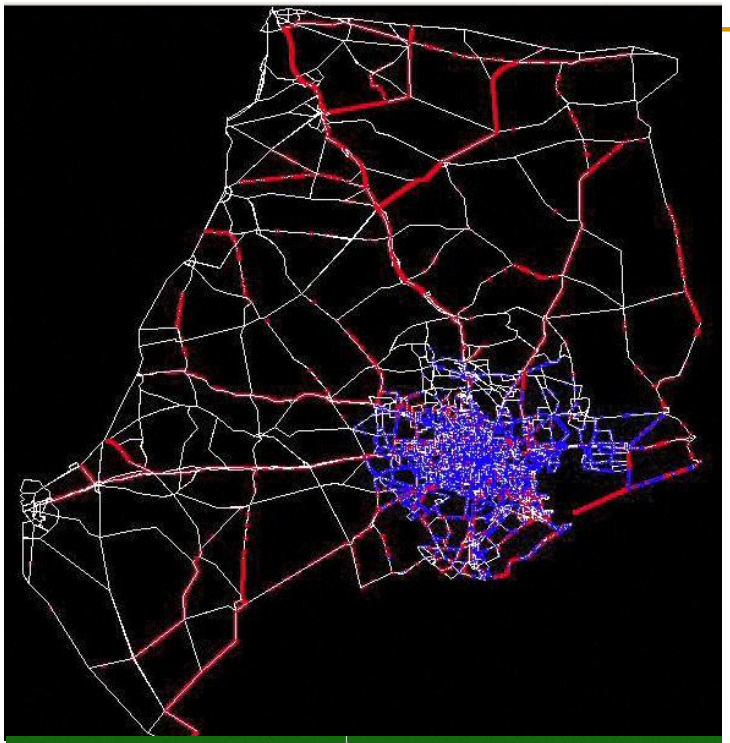
OAK RIDGE National Laboratory

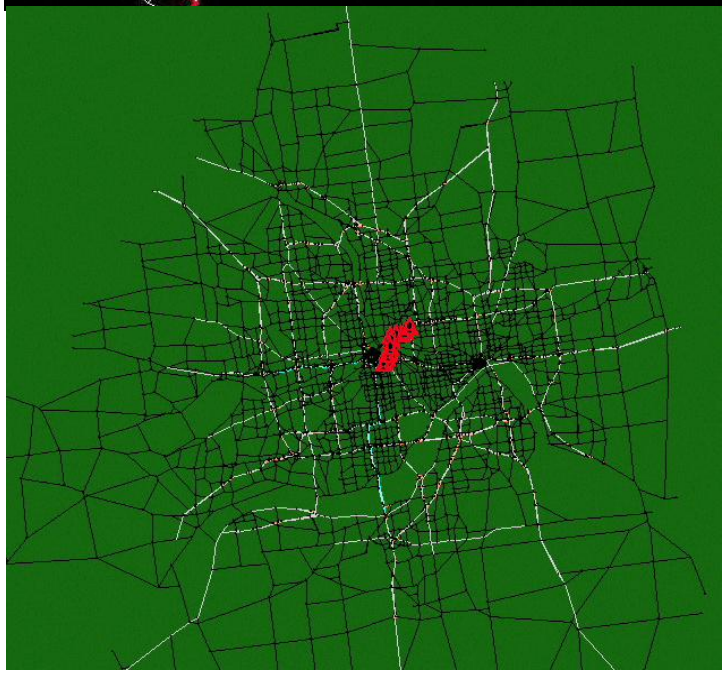
U.S. Department of Transportation Federal Highway Administration

- Sacramento (2004-2006)
  - Air quality analysis (Z1.2k, N5k, L12k, 2.8GB, 24 hr sim-assign,

UCDAVIS AGGIES

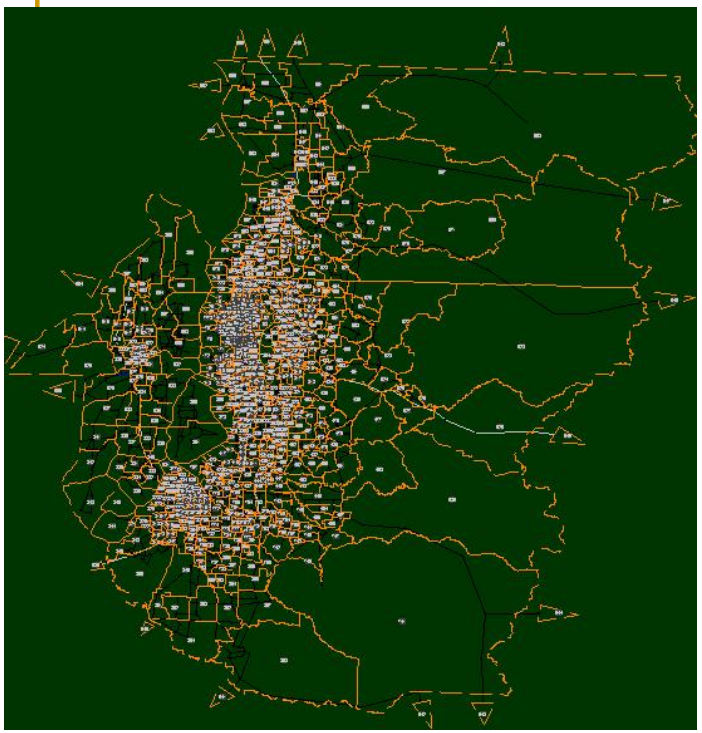
Caltrans

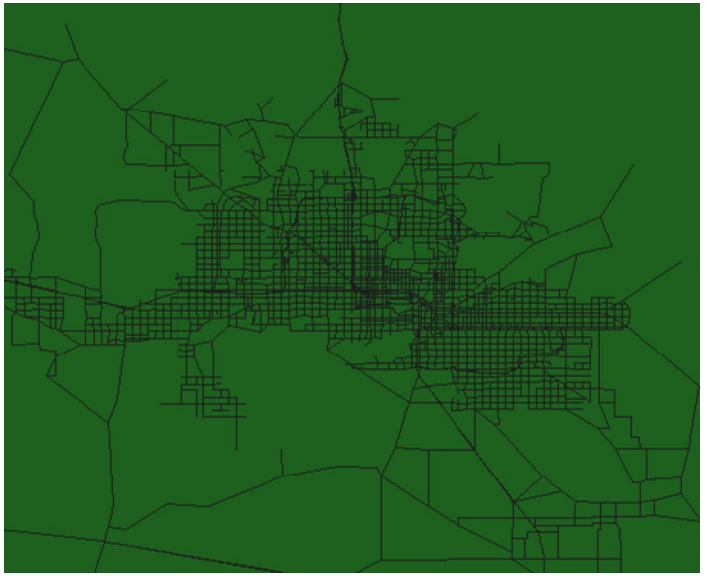




- Central Texas (2006)
  - Hurricane regional evacuation
  - Contra-flow and phase evacuation

- Twin-City (2007-present)
  - I-35 bridge collapse traffic diversion analysis
  - Integrated Corridor Management (ICM)

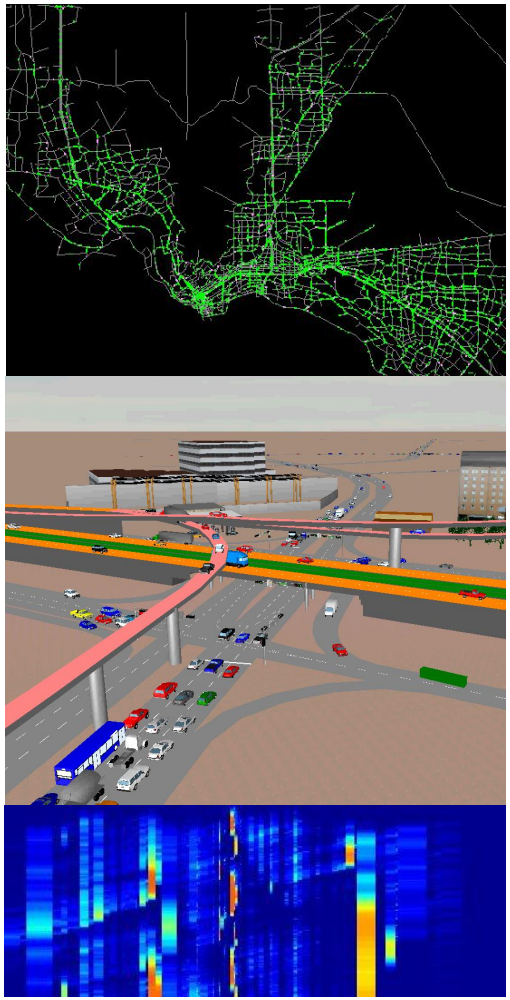




- PSRC (2008-present)
  - Test bed for integrated framework (Z1k, N6k, L1.5k, 1GB, 6 hr)
    - Land use (UrbanSim)
    - Activity-based model (AMOS)
    - DTA (DynusT/MALTA)

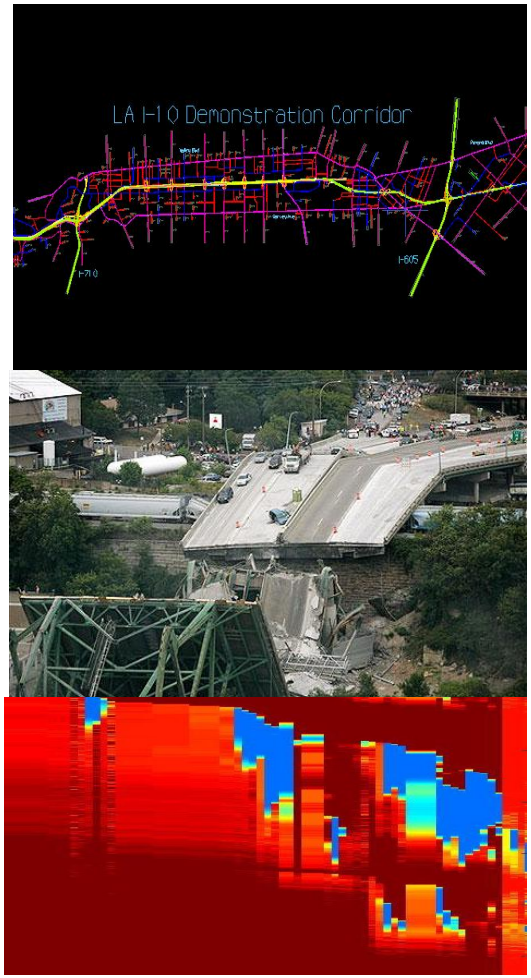
- MAG (2009-present)
  - Integrated Corridor System Management (Z2k, N4.5k, L12k, 1.5GB, 24hr for 20 iter, 12 hrs SA)
  - Cardinal Game evacuation
  - Flooding evacuation

Summary of Recent Projects



- IH corridor improvement (North Carolina, 2003-present)
- IH tolling and congestion pricing (ELP, TX-2003-present)
- IH work zone planning (ELP, TX-2004)
- Evacuation operational Planning (HOU, TX, 2007, Baltimore, MD, 2005, Knoxville, TN, 2003)
- Downtown improvement (ELP, TX, 2004)
- ICM AMS modeling (Bay Area, CA, 2006-present)
- Florida turnpike system traffic and evacuation analysis (FDOT Turnpike)

Summary of On-going Efforts



- Military deployment transportation improvement in Guam (PB, FHWA)
- Value pricing (ORNL, FHWA; SRF, Mn/DOT, TTI, TxDOT)
- Evacuation operational planning (UA, ADOT; LSU, LDOT; Noblis, FHWA; Univ. of Toronto, TTI, TxDOT)
- Integrated Corridor Management modeling (CS, FHWA, MAG)
- Bay area regional modeling (CS, MTC)
- Regional Modeling (PAG)
- Land use-activity-based model-DTA integration (UW, ASU, UA, FHWA)

Further Inquiries

- FHWA
  - Resource Center
    - Ed Fok, Edward.Fok@fhwa.dot.gov
    - Eric Pihl, eric.pihl@fhwa.dot.gov
    - Chung Tran, Chung.Tran@fhwa.dot.gov
  - HQ – traffic analysis toolbox team
    - John Halkias, John.Halkias@fhwa.dot.gov
  - Fairbank Research Center
    - Randy VanGorder, Randall.VanGorder@fhwa.dot.gov
    - Raj Ghaman, Raj.Ghaman@fhwa.dot.gov
- University of Arizona
  - Yi-Chang Chiu, chiu@email.aizona.edu
  - Eric Nava, ejnava@email.arizona.edu
- Other References
  - Available upon request